	Application No.	Applicant(s)
Notice of Allowability	09/670,054	LAKKIS, ISMAIL A.
	Examiner	Art Unit
	Jason M. Perilla	2638

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the amendment filed August 22, 2005.*

2. ☒ The allowed claim(s) is/are *1, 3-8, and 10-24 renumbered respetively as claims 1-22.*

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some*   c) ☐ None of the:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

     1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____ .

   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of

    Paper No./Mail Date _____ .

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____

4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)

6. ☒ Interview Summary (PTO-413), Paper No./Mail Date *20051107* .

7. ☒ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____ .

KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER

EXAMINER'S AMENDMENT

1.   Claims 1, 3-8, and 10-24 are pending in the instant application.

2.   An examiner's amendment to the record appears below. Should the changes

and/or additions be unacceptable to applicant, an amendment may be filed as provided

by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be

submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview

with Noel Gillespie on November 9, 2005.

The application has been amended as follows wherein the following versions of

claims 1, 3, 5-7, 16, 17, 19, and 23 replace all prior versions in their entirety:

1.   A method of operating a spread-spectrum-based wireless communication system
to efficiently utilize spectrum in the presence of multipath interference, comprising:
        dividing a stream of data-conveying symbols into a plurality of unspread
substreams at a transmitter;
        generating a common spreading code at said transmitter;
        spreading, at said transmitter, each of said plurality of unspread substreams
using said common spreading code to form a plurality of spread substreams, said
spreading activity comprising a respective temporally offsetting application of said
common spreading code to each of said plurality of unspread substreams so that said
plurality of spread substreams correspond to said plurality of unspread substreams
modulated by respective cyclic variations of said common code;
        performing a first time-frequency domain transformation on said plurality of
unspread substreams at said transmitter prior to said spreading activity;
        combining, at said transmitter, said plurality of spread substreams to form a
composite signal;
        wirelessly transmitting, from said transmitter, a communication signal formed
from said composite signal;
        receiving said received communication signal at a receiver;

despreading said communication signal at said receiver using a mismatched filter to generate a baseband signal; and

performing a second time-frequency domain transformation on said communication signal at said receiver prior to said despreading activity.

3.   A method of operating a spread-spectrum-based communication system as claimed in claim 1 wherein:

each of said plurality of ~~un~~spread substreams comprises successive blocks of data-conveying symbols, each block having a block period; and

said ~~temporally-offsetting-and~~ combining ~~activities-are-mutually~~ activity is configured so that any a portion of said composite signal is responsive to symbols from two different blocks from each of the plurality of spread substreams.

5.   A method of operating a spread-spectrum-based communication system as claimed in claim 1 wherein:

each of said plurality of ~~un~~spread substreams comprises successive blocks of data-conveying symbols, each block having a block period; and

said ~~temporally-offsetting-and~~ combining ~~activities-are-mutually~~ activity is configured so that any portion of said composite signal is responsive to symbols only from ~~common-blocks~~ one block from each of the plurality of spread substreams.

6.   A method of operating a spread-spectrum-based communication system as claimed in claim 5 wherein:

said dividing and spreading activities produce M unspread substreams and M spread substreams, respectively, where M is an integer number;

said combining activity combines said M spread substreams so that, for ~~each~~ any portion of said composite signal corresponding to one block from each of the plurality of spread subtreams, a subset P spread substreams of said M spread substreams occur first in said composite signal, where P is an integer number less than M;

said combining activity additionally comprises, for ~~each~~ any portion of said composite signal corresponding to one block from each of the plurality of spread subtreams, repeating said subset P spread substreams so that said subset P spread substreams also occur last in said composite signal; and

said method additionally comprises, between said receiving and despreading activities, removing said first-occurring subset P spread substreams from said communication signal.

7.   A method of operating a spread-spectrum-based communication system as claimed in claim 6 additionally comprising applying block encoding to the stream of data-conveying symbols ~~an input stream of data~~ so that encoding blocks coincide with said successive blocks of data-conveying symbols.

16.   A spread-spectrum-based communication system which efficiently utilizes spectrum in the presence of multipath, said communication system comprising:
        a demultiplexer for dividing a stream of data-conveying symbols into a plurality of unspread substreams;
        a spreading section coupled to said demultiplexer and configured to generate a plurality of spread substreams from said plurality of unspread substreams, said spreading section being configured so that said plurality of spread substreams correspond to respective ones of said unspread substreams modulated by respective cyclic variations of a common spreading code;
        a first time frequency domain transformation section coupled between said demultiplexer and said spreading section; and
        a combining section coupled to said spreading section and configured to form a composite signal in response to said spread substreams;
        a transmission section coupled to said combining section and configured to wirelessly transmit a communication signal formed from said composite signal;
        a receiving section configured to receive said communication signal;
        a despreading section coupled to said receiving section, said ~~dispreading~~ despreading section comprising a frequency domain equalizer to compensate for multipath, said ~~dispreading~~ despreading section being configured to generate a baseband signal in response to said communication signal; and
        a second time-frequency domain transformation section coupled between said receiver and said despreading section.

17.   A spread-spectrum-based communication system as claimed in claim 16 wherein said despreading section comprises a mismatched filter.

19.   A spread-spectrum-based communication system as claimed in claim 17 wherein:
        ~~said demultiplexer produces~~ each of said plurality of spread substreams comprises successive blocks of data conveying symbols, ~~where each block includes~~

symbols-concurrently-present-in-each-unspread-substream, and each block has having a
block period;

said spreading combining section is configured so that said composite signal is
responsive to symbols from two different blocks from each of the plurality of spread
substreams; and

said mismatched filter corresponds to a matched filter combined with a sidelobe
suppression filter.

23.   A spread-spectrum-based communication system as claimed in claim 16
wherein:

said demultiplexer produces successive blocks of M symbols that concurrently
influence said unspread substreams, where M is an integer number;

said spreading section is configured to produce M spread substreams, each of
said M spread substreams comprising successive blocks of data conveying symbols
having a block period being-responsive-to-symbols-only-from-common-blocks;

said combining section is configured so that, for each block of data conveying
symbols, a subset P spread substreams of said M spread substreams occur first in said
composite signal, where P is an integer number less than M;

said combining section is further configured so that, for each block of data
conveying symbols, said subset P spread substreams are repeated so that said subset P
spread substreams also occur last in said composite signal; and

said communication system additionally comprises a cyclic prefix removal section
coupled between said receiving and despreading sections for removing said first-
occurring P spread substreams from said communication signal.

**Claims 1, 3-8, and 10-24 are renumbered as claims 1-22 respectively, and
the claim dependency is renumbered accordingly.**

Allowable Subject Matter

3.   Claims 1, 3-8, and 10-24 renumbered respectively as claims 1-22 are allowed.

4.   The following is an examiner's statement of reasons for allowance:

Claims 1, 10-18, and 20-24 are indicated to contain allowable subject matter because the prior art of record does not disclose or obviate the application of a temporally offset cyclic common spreading code to a plurality of unspread substreams as claimed in the independent claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Perilla whose telephone number is (571) 272-3055. The examiner can normally be reached on M-F 8-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

Jason M. Perilla
November 10, 2005

KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER

jmp